CLAIMS:

1. A device for producing a control signal to control an apparatus based on the movement of a reflecting surface, comprising:

a light source for illuminating the reflecting surface;

a sensor for receiving from the reflecting surface a pattern of light that has been caused to move by movement of the reflecting surface and producing a sensor electrical signal related to said movement; and

an interface circuit for producing from said sensor electrical signal said control signal to control an apparatus.

2. The device of claim 1, wherein said sensor comprises a photo-emf material having a plurality of electrodes disposed thereon for detecting electrical current caused by differential emf generated by the motion of said pattern received by said sensor.

3. The device of claim 2, wherein said plurality of electrodes comprises a first set of electrodes arranged so as to define a first direction normal thereto, and a second set of electrodes arranged so as to define a second direction normal thereto, said first direction and said second direction being askew to one another.

4. The device of claim 3, wherein said plurality of electrodes comprises a plurality of interdigitated electrode pairs having gaps between adjacent electrodes, the material between every other said gap being having a reduced photo-emf property.

5. The device of claim 3, wherein said plurality of electrodes comprises a plurality of interdigitated electrode pairs having gaps between adjacent electrodes, said sensor further comprising a mask disposed over said plurality of electrodes so as to block light from illuminating alternate said gaps.

6. The device of claim 2, wherein said plurality of electrodes comprises a plurality of groups of electrodes arranged in different respective spatial orientations.

7. The device of claim 6, wherein said groups of electrodes comprise pluralities of interdigitated electrode pairs having gaps between adjacent electrodes, alternate gaps producing no photo-emf effect.

8. The device of claim 6, wherein said groups of electrodes are arranged in a rotationally-symmetric pattern, and the optical axis of said light source is coincident with the axis of rotational symmetry of said pattern.

9. The device of claim 6, wherein each said group of electrodes defines a maximum emf-sensitivity-vector, said sensitivity vectors forming a cross.

10. The device of claim 6, wherein each said group of electrodes defines a maximum emf-sensitivity-vector, said sensitivity vectors forming a loop.

11. The device of claim 6, wherein each said group of electrodes defines a maximum emf-sensitivity-vector, said sensitivity vectors forming a plurality of radial spokes.

12. The device of claim 6, wherein each said group of electrodes defines a maximum emf-sensitivity-vector, said sensitivity vectors forming a plurality of radial spokes and concentric arcs.

13. The device of claim 6, wherein said electrodes form concentric arcs.

14. The device of claim 6, wherein said electrodes form a substantially planar spiral.

15. The device of claim 2, wherein said photo-emf material comprises doped

gallium arsenide.

16. The device of claim 15, wherein said electrodes comprise gold:germanium alloy.

17. The device of claim 1, wherein said light source comprises a coherent light source.

18. The device of claim 17, wherein said coherent light source comprises a laser.

19. The device of claim 17, wherein said light coherent light source produces linearly polarized light.

20. The device of claim 19, wherein light reflected from said reflecting surface to said sensor is filtered to irradiate said sensor only with linearly polarized light.

21. The device of claim 18, wherein said device further comprises a laser controller for controlling the power to said laser based on the light detected by said sensor.

22. The device of claim 1, further comprising optics for directing light from said light source to the reflecting surface, thereby producing an irradiating pattern of desired size and shape on the reflecting surface.

23. The device of claim 1, further comprising optics for directing light from the reflecting surface to said sensor.

24. The device of claim 1, wherein said interface circuit comprises electrical signal-conditioning circuitry for amplifying, filtering, and scaling said sensor signal, as needed.

25. The device of claim 24, wherein said interface circuit further comprises a

conversion circuit for receiving said sensor signal following any needed amplification, filtering and scaling, and producing said control signal in a format acceptable by the apparatus to be controlled.

26. The device of claim 1, wherein said interface circuit comprises means for decomposing said sensor signal into signals representative of translation of the reflecting surface and rotation of the reflecting surface, respectively.

27. The device of claim 1, wherein said interface circuit comprises means for decomposing said sensor signal into command signals related to predetermined motions of the reflecting surface.

28. The device of claim 1, wherein said interface circuit comprises means for detecting a signal condition for activating or deactivating continuance of a control signal representative of a current motion.

29. The device of claim 1, wherein the apparatus to be controlled is a digital computer.

30. The device of claim 1, wherein the apparatus to be controlled is a display device for representing a three-dimensional image, wherein sensor signals resulting from translation of the reflecting surface produce translation of an image produced by said display device, and sensor signals resulting from rotation of said reflecting surface produce rotation of said image produced by said display device.

31. The device of claim 1, wherein the apparatus to be controlled is a robotic device wherein sensor signals resulting from translation and rotation of said reflecting surface produce corresponding motion of said robotic device.

32. The device of claim 1, wherein said device to be controlled is a virtual reality device wherein sensor signals resulting from motion of said reflecting surface produce predetermined responses in virtual space.

33. A device for producing a control signal to control an apparatus, comprising:

a light source for illuminating a surface placed over said device;

a sensor for receiving from said surface a pattern of light that has been caused to move by movement of said surface and producing a sensor electrical signal related to said movement; and

an interface circuit for producing from said sensor electrical signal said control signal to control an apparatus.

34. A device for producing a control signal to control an apparatus, comprising:

a case;

a support member for movably supporting said case on a surface;

a light source disposed within said case for illuminating said surface on which said case is supported;

a sensor disposed within said case for receiving from said surface a pattern of light that has been caused to move by movement of said case over said surface and producing a sensor electrical signal related to said movement; and

an interface circuit for producing from said sensor electrical signal said control signal to control an apparatus.

35. A device for producing a control signal to control an apparatus, comprising:

a case for movably supporting a ball for rotation;

a light source for illuminating the surface of said ball;

a sensor for receiving from said surface of said ball a pattern of light that has been caused to move by rotation of said ball and producing a sensor electrical signal related to said movement; and

an interface circuit for producing from said sensor electrical signal said control signal to control an apparatus.

36. A method for controlling an apparatus based on the movement of a reflecting surface, comprising:

illuminating the reflecting surface;

receiving from the reflecting surface a pattern of light that has been caused to move by movement of the reflecting surface and producing a sensor electrical signal related to said movement; and

producing from said sensor electrical signal said control signal to control an apparatus.

37. The method of claim 36, wherein said illuminating step is carried out with coherent light.

38. The method of claim 37, wherein said coherent light is linearly polarized.

39. The method of claim 38, wherein light from said reflecting surface is filtered to receive only linearly polarized light.

40. The method of claim 36, wherein said reflecting surface is a diffusely scattering surface.

41. The method of claim 40, wherein said reflecting surface is a portion of a human hand.